

APPENDIX A

AOC Investigation Boring Logs, Well Purge Records and, Potentiometric Surface Map (Included on CD)

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APPENDIX B

Site-specific Human Health RBSL Calculations (Included on CD)

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APPENDIX C

ProUCL Output for Metals in Soil and Exposure Point Concentrations (Included on CD)

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APPENDIX D

Johnson and Ettinger Model Results (Included on CD)

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APPENDIX E

Data Validation Reports (Included on CD)

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APPENDIX F

Response to EPA and PREQB Comments

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**CPCPRC RESPONSE TO EPA AND PREQB COMMENTS ON
July 2012 – Area of Concern Characterization Report
Chevron Phillips Chemical Puerto Rico Core, LLC Guayama, Puerto Rico
EPA ID No PRD991291972**

January 31, 2013

The following comments have been developed based on the evaluation of the Area of Concern Investigation Report (Report) dated July 2012, submitted by North Wind on behalf of Chevron Phillips Puerto Rico Core, Inc. (CPCPRC), Guayama, PR.

General Comments¹

The report should present information on the proposed future uses of the facility. This will help determine what potential future receptors may be found at the facility, the media that potentially need to be addressed, and what protective levels may be appropriate.

The risk-based screening levels (RBSLs) are presented in numerous tables in this report. However, the calculations for the values are not presented either in the report or in the footnote sections of the tables. It is difficult to verify these values without knowing where they came from. The report should clearly indicate what chemical was used as a surrogate for Sulfolane since there are no EPA-recommended RBSLs or toxicity values for this chemical. Although, Chevron mentioned during EPA-Chevron meetings that cleanup standards for the Texas Risk Reduction Program² were used for this analyte, the report does not state or explain its applicability. In addition, there are no RBSLs for sediment and surface water, the report should indicate how the RBSLs these media were calculated.

The Screening Level Ecological Risk Assessment includes evaluation of potential ecological risks from exposure to sediment and surface water in the Effluent Channel but excludes potential risks from exposure to the soil pathway. Appropriate justification should be provided as to why this potential ecological pathway was excluded from the report.

Response:

- Future Receptors and Protective Levels – it was clarified in the Report (Sections 1.2.1 and 3.4) that based on current surrounding land use and likely expectations of future land use, the site will remain industrial in nature. Accordingly, an industrial worker, a construction worker and a trespasser were identified as the potential onsite receptors. Offsite migration of groundwater and its use as drinking water by a hypothetical resident was also conservatively considered. The protective levels were developed for the potential receptors and the final RBSL was the lowest concentration that would be protective of the onsite receptors as well as the groundwater for the residential potable use.
- Risk-based Screening Levels (RBSL) – Detailed spreadsheets with media- and receptor-specific input and exposure parameters and equations are presented in Appendix B. All modified Skinner list chemicals are included. A spreadsheet for calculating the groundwater protective levels is also included. The final media-specific RBSLs were then compiled by taking the lowest concentration from the applicable receptors and pathways. The final RBSLs are summarized in Table B-1 in Appendix B.
- Sulfolane Toxicity – as a result of the teleconference with EPA and EQB on February 21, 2013, a Provisional Peer-reviewed Toxicity Value (PPRTV) has become available for sulfolane. The risk and RBSL calculations for sulfolane are based on the EPA-provided PPRTV.
- RBSLs for Surface Water and Sediment – The ecological screening levels for the modified Skinner list chemicals for the surface water and sediment are included in Appendix B. The reason they were

not presented in the main body of the Draft report is because there were no exceedances of the ecological screening levels and therefore, no chemicals of concern (COC).

- Screening Level Ecological Risk Assessment (SLERA) for Surface Soil – Screening of surface soil against ecological screening levels has been included in the revised SLERA (Section 6.2.1).

Specific Comments

1. Section 1.1 Purpose, third paragraph mentions that Sulfolane is not on EPA's Target Compound List, but was added during the implementation of the Soil Management Plan (SMP) when sulfolane was suspected beneath a demolished structure (Tank 540).

Comment: *the EPA's Target Compound List was not mentioned on the SMP, the reasoning for such statement is unclear and confusing. Please, explain or omit. In addition, this paragraph should mention that Tank 540 was used for the storage of sulfolane and that during its removal/dismantling sulfolane was suspected beneath the tank/components structure.*

Response: The reference to sulfolane not being on the EPA's Target Compound List has been removed. The text in Section 1.1 has been revised to indicate that Tank 540 was used for sulfolane storage and sulfolane was detected in the soil during the tank dismantling.

2. Section 1.2.1 *Site Setting and Use*, indicates that the surrounding area is predominantly industrial, with a small community, Las Mareas, south of the facility.

Comment: *The information provided in this Section can be consolidated into Section 3.4, page 3-2, and should include the Reunion Ward, located north of the facility, as one of the nearby communities.*

Response: Section 1.2.1 has been revised to include the Reunion Ward community to north. Section 3.4 is revised to include Reunion Ward as a community to the north of the Facility.

3. Section 2 *Area of Concern (AOC) Investigation*, summarizes the investigative activities related conducted at the facility/site during its demolition and dismantling events. The second paragraph mentions...the areas of potential contamination were identified and sampled. If the analytical results indicated contamination was present, the area was retained as an AOC for further investigation and characterization.

Comment: *Rephrase the paragraph to indicate that the sampled areas were retained as an AOC when the analytical results exceeded the RBSLs.*

Response: The suggested change has been made in the Section 2, second introductory paragraph.

4. Section 2.1 *AOC Investigation Sampling Program*, the four paragraph first bullets, indicates that prior to commencing fieldwork a potentiometric surface map was generated using water levels measured during the most recent sampling event.

Comment: *Please, include the referenced map and the water levels measurements that were applied for its development.*

Response: The potentiometric surface map used to help guide the AOC Investigation activities is now included in Appendix A along with the soil boring logs from the investigation.

5. Section 2.1.4 *Groundwater*, mentions that a few locations the boring was advanced beyond 20ft to 28ft. These borings were advanced to locate the clay aquitard located between the upper and lower alluvial aquifer. Water was not located at the borings during drilling, borehole locations (i.e., 0403-11, 0401-11).

Comment: *The figures with the boreholes identification numbers are described in Figure F-6 to F-24. However, the Section does not make such reference. In order to ensure a thorough understanding of the investigation and these particular events, please, refer to the corresponding figures.*

Response: Section 2.1.4 has been revised to indicate that the AOC sampling locations are presented on Figures 4-2 to 4-20, and the soil boring logs are presented in Appendix A.

6. Section 3.4 *Demographics and Land Use*, please refer to comment on item 2. In addition, please, include Las Mareas Ward, which is located south of the facility. A figure identifying this information as well as the location of the nearby properties will be an asset during the evaluation of other aspects of the investigation (e.g., conceptual site model).

Response: Section 3.4 has been revised accordingly and Figure 1-1 now includes the location of Las Mareas and other nearby properties.

7. Section 4.2 *Surface and Subsurface Soil Results*, needs to be reviewed carefully since there are many errors present – spelling, missing words, tank numbers in the title do not agree with numbers in the text, maximum concentrations of chemicals do not agree with the number of chemicals listed etc. All of these errors should be corrected.

Response: The information mentioned in the text has been verified against the data tables and figures for accuracy, and corrected as necessary.

8. Section 4.3.1, *AOC Groundwater Data*, mentions that the wells were sampled using low flow sampling techniques using peristaltic pump dedicated tubing.

Comment: *A Puerto Rico's south coast groundwater study data, the Groundwater-Quality survey of the South Coast Aquifer of Puerto Rico³, which was generated by the United States Geological Survey (USGS), suggests that Chevron's site might be affected by saline intrusion. Given, that the low flow sampling technique requires specific conductance readings to ensure well stabilization. These readings records could be useful to detect saline intrusion among other anomalies. Although, it is not under the scope of work of the approved AOC Work Plan, please, include (compact disk) and evaluate the monitoring wells stabilization recordings, particularly those related to conductivity.*

Response: The field records for the open boreholes and monitoring wells sampled during the AOC Investigation are now included in Appendix A.

9. Section 4.7 *Extent of Contamination*, indicates that there is a Maximum Concentration Level for sulfolane; however, the Texas Commission of Environmental Quality (TCEQ) has adopted a standard of 320 µg/L for sulfolane in residential drinking water.

Comment: *Currently, there is no EPA-recommended media specific risk-based screening value for sulfolane. The report indicates that TCEQ residential drinking water value was used for groundwater screening. However, the report does not explain or support the criteria applied for selecting the referenced screening values (i.e., groundwater media, surface soil). Given the scenario, the facility*

must develop site/media specific risk-based screening values for sulfolane and evaluate its nature and extent for further evaluation and remediation .

Response: Please see the response to the General Comment. Site-specific RBSLs have been developed for sulfolane based on the EPA-provided PPRTV for ingestion and screening PPRTV for inhalation.

10. Section 5.3 *Summary of Analysis*, mentions that migration and fate of both benzene and sulfolane, as well as other contaminants in groundwater, are influenced by the active application of interim measures. These measures along with natural attenuation process work to reduce contaminant mass and influence contaminant extent, fate and, transport.

Comment: *EPA believes that such conclusion is premature and does not apply to sulfolane, given that further investigation is required.*

Response: CPCPRC believes that with respect to benzene and sulfolane in groundwater, there is reduction in the contaminant mass because the EFR interim measure involves physical removal of the contaminated groundwater. Based on this comment and the February 21, 2013 call with EPA and EQB, a Supplemental RFI Work Plan for additional soil and groundwater investigation of sulfolane nature and extent has been submitted.

11. Section 6.1.2.3 *Potential Receptors*, the subsections headings must be renumbered. As presented, the resident subsection appears to be the sole potential receptor. In addition, the resident exposure pathway summary indicates that the groundwater contact would include direct ingestion, dermal contact and inhalation of vapors emanating from the household usage of groundwater. According to the report, these exposure pathways were quantitatively evaluated for assessing the potential risk to the resident.

Comment: *The Residential Risk from Groundwater Vapor Intrusion into Buildings, AOC Report Appendix C, presents information that may contradict the above mentioned statement (highlighted), which does not consider exposure through vapor (volatilization) migration from groundwater to indoor air. Please review and modify as needed.*

Response: The format for subsection headings have been corrected based on this comment.

Section 6 includes a new section; Section 6.1.8 – Risks from Vapor Intrusion. This new section summarizes the potential inhalation risks from vapor intrusion. The detailed information for the vapor intrusion modeling is presented in Appendix D - Johnson and Ettinger Model.

12. Section 6.1.2.5, *Industrial Workers*, indicates that a limited numbers of workers remain at the site, and that the exposure was limited to surface soil. Exposure to subsurface soil, groundwater, surface water and sediment were considered to be incomplete exposure pathways.

Comment: *The report shall consider or include Advanced Energy Systems (AES) employees as potential industrial receptors. According to the June 2012 Upper Alluvial and June 2011, benzene plume extends to AES property and benzene highest concentration was collected from wells nearby the property line (new well-1 234,000 ppb in 2011 and 190,000 ppb in 2012). Therefore, these potential receptors should be incorporated into the site's conceptual site model and evaluated accordingly.*

Response: The indoor vapor intrusion modeling presented in Appendix D has been revised to include an office worker in the AES administration building and a worker in the AES shed located near the southwest corner of the CPCPRC property.

13. Section 6.1.6.1, *Resident*, refer to item 11.

Response: Comment noted, the format for Section 6.1.2.3 subsections has been corrected based on this comment.

14. Section 6.1.6.3, *Industrial Worker*, refer to item 12.

Response: The revised indoor vapor intrusion modeling in Appendix D includes the onsite CPCPRC industrial worker *and* two structures on the AES property as mentioned in response to Item 12, above.

15. Section 7, *Summary and Conclusions*, mentions that the next step in the RCRA process as required by the Order will be to develop a work plan for the Corrective Measures Study.

Comment: *As mentioned during the EPA/Chevron December 6, 2012 meeting, given to the findings of the AOC Investigation (i.e., sulfolane detections on groundwater and soil), is deemed necessary to determine the nature and extent of the sulfolane contamination and develop media specific risk based screening levels that are protective to human health and the environment. Consequently, a Supplemental RCRA Facility Investigation Report¹ shall be developed to describe the nature and extent of sulfolane, migration pathways, the potential threat to human health and the environment and it shall be used to support the corrective measures study.*

Response: CPCPRC has submitted the Supplemental RFI Work Plan for additional soil and groundwater characterization for sulfolane. In addition, an outline for the Supplemental RFI Report has been included with the revised AOC Investigation Report as Appendix F.

Figures

16. Figures 4-22, *June 2012 Benzene Lower Alluvial Aquifer* and Figure 4-29, *June 2012 Sulfolane Lower Alluvial Aquifer*, identify the concentrations of benzene and sulfolane, respectively, at the lower alluvial from on-site and off-site monitoring wells. However, the figure is not legible and this information is not presented as intended. Please modify the figures as necessary.

Response: The figures have been revised to be legible, and to show the concentrations of benzene and sulfolane in the lower aquifer.

Tables

17. Tables 4-3 – 4-5 indicate that antimony was not detected in any of the ten surface soil or subsurface soil background samples. However, in a total of 259 soils samples, antimony was detected 55 times in surface soil samples and 47 times in subsurface soil samples for a total of 102 detections. The statistical conclusion for antimony is that it is below or equal to background. This conclusion seems to be incorrect.

Response: The EPA software ProUCL takes into account the distribution of the detection limits for the non-detected data. Based on a statistical comparison of the detected concentrations and the detection limits, the software concluded that site antimony is not above background. It is noted that a

similar situation exists with cadmium which was not detected in the background samples; however, ProUCL determined that the site cadmium was above background.

It is further noted that metals were not excluded from risk calculations. Potential risks both with and without background metals were discussed separately in Section 6.3 - Uncertainty Analysis.

18. Tables 6-4 – 6-5 and 6-9 – 6-10, were included on the provided compact disk, but were not presented on the hardcopy report. Please, explain the discrepancy.

Response: Due to the large size of these tables they are not printed in hardcopy. In addition, we believe examination and review of the content of the electronic versions (i.e., the spreadsheet formulas and calculations) will be easiest for EPA and PREQB.

19. Appendix C – Johnson and Ettinger Model (Technical Memorandum: Residential Risks From Groundwater Vapor Intrusion Into the Buildings-Memo), indicates that CPCPRC used the Johnson and Ettinger model assess the potential risk occupants in a hypothetical structure either on the CPCPRC Facility or in off-site area adjacent to the facility.

Comment: *The EPA does not recommend modeling as the only line of evidence to screen out a site. It is most appropriately used in conjunction with other lines of evidence (e.g., indoor air data, concurrent outdoor air data, soil gas data). In addition, the data that was generated as a result of such modeling should have been clearly identified and explained on Section 6, Baseline Risk Assessment, of the Report and respective tables. The Technical Memorandum does not include industrial workers from the nearby facility (i.e., AES) as receptors, and as a result, it does not consider the factors derived from this scenario. In addition, the buildings dimensions applied for the residential scenario are not realistic to the local housing dimensions (i.e., 12 ft ceilings, 1000 square feet).*

Response: As mentioned in the Response to Item 11, two structures on the AES property were evaluated. No area or media were screened out from further consideration based on the vapor intrusion modeling. It is noted that the vapor intrusion modeling demonstrates that the chemicals of concern in the modeled indoor air are the same as those identified as in the HHRA (i.e., the BTEX constituents).

APPENDIX G

Outline for the Supplemental RFI Report

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Supplemental RFI Report – Annotated Outline

Acronyms and Abbreviations

- 1.0 Introduction
 - 1.1 Purpose
 - 1.1.1 SRFI Investigation Objectives and Approach
 - 1.2 Site Background
 - 1.3 Site Setting and Use
 - 1.4 Topography and Physiography
 - 1.5 Surface Water Features
 - 1.6 Climate and Precipitation
 - 1.7 Demographics and Land Use
 - 1.8 Previous Investigations
 - 1.8.1 RFI Investigations
 - 1.8.2 AOC Investigations
 - 1.9 Semi-Annual Groundwater Sampling
 - 1.10 Ongoing Interim Actions
- 2.0 Investigation Data
 - 2.1 RFI Data Summary
 - 2.1.1 Analytical Data – brief discussion of analytical data (i.e., no sulfolane and AOC Report to cover other COCs)
 - 2.1.2 Hydrogeology
 - 2.2 AOC Investigation Sulfolane Data Summary
 - 2.2.1 Surface Soil
 - 2.2.2 Subsurface Soil
 - 2.2.3 Groundwater
 - 2.3 Semiannual Monitoring Sulfolane Data Summary
 - 2.4 Supplemental RFI Data
 - 2.4.1 Surface Soil
 - 2.4.2 Subsurface Soil
 - 2.4.3 Groundwater
- 3.0 Nature and Extent of Sulfolane Contamination
 - 3.1 Surface Soil
 - 3.2 Subsurface Soil
 - 3.3 Groundwater
- 4.0 Fate and Transport of Sulfolane
 - 4.1 Lithologic and Other Physical Considerations
 - 4.2 Natural Attenuation
 - 4.2.1 Adsorption
 - 4.2.2 Biodegradation
 - 4.2.3 Volatilization to the Atmosphere

4.2.4 Dispersion and Diffusion

5.0 Human Health Risk Assessment

- 5.1 Risk Assessment Data
- 5.2 Data Evaluation
- 5.3 Exposure Assessment and Site-Specific Exposure Model
- 5.4 Calculation of Exposure Point Concentrations
- 5.5 Toxicity Assessment
- 5.6 Quantifying Chemical Intake
- 5.7 Risk Characterization
- 5.8 Summary of Potential Risks by Receptor Group
- 5.9 Cumulative Risk
- 5.10 Uncertainty Assessment
- 5.11 Conclusions

6.0 Ecological Characterization

- 6.1 State of Practice
 - 6.1.1 Brief synopsis of Sulfolane and Ecological Risk Assessment

Appendices

- A Soil Boring Logs and Field Forms
- B HHRA-Related Backup Information

Attachments

A complete analytical database and spreadsheets used for risk calculations are provided with this report in electronic format on compact disk (CD).

